AlticeLabs@UA

Available research projects

Project #1

Consumer Protection and Content Regulation

The exposure of consumers to inappropriate content and their protection, especially in the case of children and young people, given the lack of regulation, the number of channels and the degree of exposure that exists today, both on social networks, in the content of OTT streaming offers, in chats, among others, requires the use of innovative approaches and new business opportunities. However, the volume of content and the demand for real-time or near real-time solutions make a traditional curation approach unfeasible. In this context, a feasibility study is proposed for a technical solution that combines artificial intelligence to create AI agents responsible for analyzing video, audio, and text streams in TV and Internet services. These agents would identify inappropriate content (such as violence, hate speech, or deepfakes) based on predefined or adaptive criteria, and share classification information in real time with other consuming systems, with integration into network infrastructures (such as fiber gateways).
The proposed solution is based on the enforcement of parental control policies per profile on the central device (fiber gateway). As with other security policies (such as WPA, or access blocks by URL, time, or device), the customer can always choose to enable or disable this protection measure. The analysis and protection model could also be expanded to:

- Block scams, phishing campaigns, malware, etc., and protect home networks;
- Control access times and duration of use for social media, games, etc., by category;
- Enable an alert-based model for human (parental) review instead of directly blocking content;
- Block content that violates the law (e.g., piracy websites, dark web resources);
- Automatically replace content with awareness tools, such as tutorials with warnings about risks and best practices;
- Provide protection against content generated by generative AI (e.g., by leveraging classification from services such as Azure AI Content Safety).

Project #2

System for Automatic Identification of Program Transitions in the Context of TV Channels Using Artificial Intelligence

It is intended to develop a system capable of accurately detecting and identifying (hour, minute, second) the exact moment of transition between programs (end of a program and start of the next) in the context of broadcast TV channels, whether generalist or specialized (e.g., movie, series, or sports channels). Using audio/video processing techniques, computer vision, and machine learning, the system should analyze multimodal features to identify patterns and visual or audio signals that characterize the start and end of various types of programs. The main objective is to create a robust and scalable solution (i.e., one that does not require specific training for each program type or channel), enabling automatic content indexing and the generation of metadata for those same contents.

Project #3

Vital Signs Detection Sensors

The field of digital health has been evolving slowly but steadily. New devices, applications, and algorithms are emerging every day to support healthcare professionals in treating people under their care. However, to optimize healthcare delivery and make better use of available resources, there has been a growing focus on prevention. In this context, it becomes critical to raise public awareness about monitoring their health status using devices capable of collecting vital signs and other relevant parameters for assessing overall well-being.

There are many devices on the market capable of performing this function, both from a professional, personal and clinical perspective, given the growing trend of placing more responsibility on individuals for managing and monitoring their own health. Devices such as oximeters, scales, blood pressure monitors, thermometers, glucometers, and other Bluetooth-enabled equipment can collect data and send it to the cloud, which then makes it available to mobile and/or web applications accessible by patients and/or healthcare professionals. This enables real-time monitoring of everyone's health status.

Altice Labs offers a telemonitoring and teleconsultation product called SmartAL, which integrates devices of this kind and provides a wide range of services to social and healthcare institutions, enabling them to manage the daily care of the individuals under their responsibility. To promote this concept and encourage preventive healthcare, we aim to provide a health assessment booth designed to evaluate a person's general health status that would include vital signs sensors properly adapted for occasional visits by people of all ages and genders (including those with reduced mobility). The physical booth already exists; thus, the goal of this project is to design and adapt the sensors so they can be embedded or positioned in specific parts of the booth and

collect vital signs in a non-intrusive way. The main objective is to raise awareness among visitors about general aspects of their health and well-being by offering them an immersive experience.

Project #4

Child Locator Bracelet

One of the most common concerns for families today is keeping children safe. Whether on vacation or during weekends, families are constantly alert about keeping their children close. However, any small distraction can lead to difficult, sometimes even desperate situations where children get lost and cannot find their way back. There are already apps and wearables equipped with Bluetooth and GPS that assist in locating pets and children, but they often include many additional features that increase the cost of the devices. The goal of this project is to create a simple bracelet equipped with GPS and mobile connectivity or Bluetooth (similar to Apple's AirTag) capable of communicating the child's location to a third-party platform (e.g., the police).

Project #5

GenAI Application for Dashboard Creation and Data Correlation Identification

The arrival of Generative Artificial Intelligence has enabled the generation of original content such as text, images, and code through learning from large volumes of data. This technology has revolutionized the digital world, impacting diverse fields such as Economics, Education, Health, and more. This project proposes combining GenAI with an urban management platform to provide new functionalities. Starting from a data platform that aggregates information from various verticals, the aim is to enable data discovery and the creation of customized dashboards through natural language, the identification of correlations among data from diverse sources, and the generation of explanatory texts for the available charts. The objective of this proposal is to develop a functional prototype module supporting these features, for integration into the urban management platform, thereby assisting users in decision-making based on the insights gained through this technology.

Project #6

Intelligent Agents in Production: Study and Integration of Frameworks such as MCP and Agent2Agent

Agents based on Large Language Models (LLMs) have achieved importance due to their ability to reason, plan, and execute complex tasks. However, for these agents to operate robustly in production environments, it is essential to ensure three key aspects: standardized access to tools, orchestration and collaboration capabilities among multiple agents, and maximum reliability and security in the production setting. The Model Context Protocol (MCP) addresses the first challenge by providing a standardized format for agents to access resources and tools.
The communication between agents, which is necessary to build multi-agent systems, is addressed by frameworks such as the Agent2Agent Protocol. Finally, it is essential to undertake issues related to production environments, such as scalability, security, and system observability.
This project proposes developing an agent system combining these three layers:

1. Use of MCP to structure communication between agents and tools in a standardized way;
2. Evaluation of multi-agent frameworks, focusing on their compatibility and integration with MCP;
3. Assessment of observability in agent frameworks (e.g., tracing), as well as analysis of security and scalability aspects of the system.

A functional prototype will be built, where multiple agents coordinated by a multi-agent framework cooperate with each other using tools via MCP.

Project #7

Real-Time Applications with LLMs and Voice Interfaces: Optimization of Latency and Scalability

Large Language Models (LLMs) have transformed the way we interact with computational systems. One of the most promising applications in this field is the use of real-time voice as an interaction channel with LLMs – whether for personal assistants, customer service, technical support, and more. However, using LLMs in real-time contexts to ensure a smooth conversation presents technical challenges, such as latency, maintaining context in long conversations, and system scalability. This project proposes the development of a real-time application that enables voice interaction with an LLM-based agent, focusing on latency reduction and real-time response delivery. The application will be built on an architecture optimized for production use, employing techniques such as:

- Optimized voice transcription using Automatic Speech Recognition (ASR) models;
- Preprocessing and compression of prompts;
- Validation between local and cloud-based models;
- Validation of model fine tunning;

- Other techniques.

Project #8

Automatic Generation of Test Cases from MIBs Using Natural Language Models (LLMs) for SNMP Agent Testing

Network and system monitoring heavily depends on the reliability of SNMP (Simple Network Management Protocol) agents, which are responsible for exposing operational metrics and responding to management requests. However, the functional validation process of these agents is often manual, time-consuming, and prone to errors, limiting test coverage and delaying development and integration cycles. This project proposes the development of an "intelligent test automation platform" for SNMP agents, exploring Artificial Intelligence techniques to transform MIB (Management Information Base) files into complete and dynamic test sets.
Through syntactic and semantic analysis of MIBs and using natural language models (LLMs) and machine learning algorithms, SNMP tests (GET, SET, WALK, among others) will be automatically generated, tailored to the types and permissions of the defined OIDs. Additionally, AI will be applied in the "intelligent validation" of agent responses, enabling:

- Detection of anomalies and out-of-pattern behaviours (e.g., extreme or unexpected values);
- Automatic classification of SNMP failures based on historical patterns;
- Predictive generation of new test cases, focusing on areas more prone to errors.

This approach aims not only to significantly accelerate the testing and validation process but also to enhance the quality and robustness of SNMP agents in critical environments. By enabling continuous, adaptable, and self-learning testing, the system will directly contribute to reducing production incidents, thereby improving the reliability of network management infrastructure.

Project #9

Exploration and Implementation of the Table-Augmented Generation (TAG) Concept for Intelligent Database Querying with Analytics

The data universe of a telecommunications operator is particularly challenging due to the high volume, velocity, and diversity of continuously generated data. This ecosystem includes raw data, real-time data, time series, and statistical data or events, each with specific storage and processing requirements.

Interacting with databases through natural language queries has been a persistent challenge in the field of Natural Language Processing (NLP). Traditional methods, such as Text2SQL, focus on translating natural language questions into SQL queries but face limitations when dealing with questions that require complex reasoning or additional knowledge. Table-Augmented Generation (TAG) emerges as an innovative approach that integrates language models with database systems, enabling a deeper understanding and more accurate responses to user queries.

The objective of this project is to explore and set up a real laboratory environment where the functioning of TAG can be analyzed, its parameterization requirements defined, integrated with transactional and analytical databases, and its impact on data management in the context of NOSSIS One, Altice Labs' OSS solution, evaluated.

Project #10

Exploration of AI Techniques for Service Type Inference in Home Wi-Fi

Home Wi-Fi networks are now one of the main determinants in customers' perception of internet service quality. Although solutions like Altice Labs' Smart Wi-Fi platform provide significant visibility to operators, effective control of the home environment remains limited due to the specificities of homes and internal and external interferences 1.

Current passive monitoring measures, based on the network's Layer 2, provide a comprehensive view of the dynamics between nodes and devices. However, they do not allow for detailed identification of the types of services in use, which are often crucial for deeper problem analysis and QoS optimizations 1.

This knowledge can be applied to:

Significantly improve problem resolution;

Implement dynamic traffic prioritization policies, improving the quality of service for critical applications;

Offer greater operational intelligence to the Smart Wi-Fi platform, enhancing the end-user experience 1.

This project proposes exploring AI/ML techniques that, based on observed traffic patterns in the network, can infer the services in use, such as streaming, gaming, video conferencing (Teams, Zoom), browsing, or P2P.